

CLAIMS

[1] An acoustic heating apparatus comprising a first stack sandwiched between a high-temperature-side heat exchanger and a low-temperature input-side heat exchanger in a first tube portion and a second stack sandwiched between a low-temperature-side heat exchanger and a high-temperature output-side heat exchanger in a second tube portion, the acoustic heating apparatus characterized in that

5 a temperature gradient is generated in the second stack by propagating a standing wave and a traveling wave

10 generated in a loop tube from the first stack to the second stack, and heat is output from the high-temperature output-side heat exchanger disposed on the second stack side.

[2] The acoustic heating apparatus according to Claim 1,

15 wherein the loop tube comprises the first tube portion and the second tube portion, which are disposed while standing relative to the ground, and connection tube portions connecting the first tube portion to the second tube portion.

[3] The acoustic heating apparatus according to Claim 2,

20 wherein the first stack disposed in the first tube portion is located at a level higher than the level of the second stack disposed in the second tube portion.

[4] The acoustic heating apparatus according to Claim 2,

25 wherein the heat exchangers disposed on the first stack side are the high-temperature-side heat exchanger and the low-

temperature input-side heat exchanger in that order from above.

[5] The acoustic heating apparatus according to Claim 1, wherein when one end of a linear tube portion is connected 5 to one end of the connection tube portion, an intersection of the respective center axes is assumed to be a start point of a circuit, and an entire length of the circuit is assumed to be 1.00, the center of the first stack is set at a position corresponding to 0.28 ± 0.05 relative to the entire 10 length of the circuit.

[6] The acoustic heating apparatus according to Claim 1, wherein when an entire length of the circuit is assumed to be 1.00, a first peak of the pressure variation of a working fluid along the circuit is present in the vicinity of the 15 first stack, and a second peak is present at a position corresponding to about one-half the entire length of the circuit, the second stack is disposed in such a way that the center of the second stack is positioned past the second peak.

20 [7] The acoustic heating apparatus according to Claim 2, wherein the first tube portion and the second tube portion are set to be longer than the connection tube portion.

[8] The acoustic heating apparatus according to Claim 2, wherein the shapes of corner portions at the boundaries 25 between the first tube portion and the corner portion and

between the second tube portion and the corner portion are shapes suitable for totally reflecting the standing wave and the traveling wave between the connection tube portion and the tube portions.

5 [9] The acoustic heating apparatus according to Claim 2, wherein an acoustic wave generator for generating a standing wave and a traveling wave is disposed on the outer perimeter portion or in the inside of the loop tube.

10 [10] The acoustic heating apparatus according to Claim 1 or Claim 2, wherein the first stack or/and the second stack include meandering connection channels.

15 [11] The acoustic heating apparatus according to Claim 1, wherein a material for the first stack or/and the second stack is composed of at least one type of ceramic, sintered metal, gauze, and nonwoven metal fabric, and the $\omega\tau$ (ω : an angular frequency of the working fluid, τ : temperature relaxation time) thereof is configured to become within the range of 0.2 to 20.

20 [12] An acoustic heating system comprising a plurality of acoustic heating apparatuses according to any one of Claims 1 to 11, wherein a high-temperature output-side heat exchanger in one acoustic heating apparatus is connected to a high-temperature-side heat exchanger in another acoustic heating apparatus adjacent thereto.